

## **Further amended list of claims for Application 10/566,482**

THE CLAIMS DEFINING THE INVENTION (AS AMENDED) ARE AS FOLLOWS:

1. (Currently amended) A monolithically integrated biochip for testing biological substances comprising a plurality of binding sites, optical means for determining a specific binding event at each binding site, wherein the plurality of binding sites are monolithically integrated by processing one substrate with the optical means for determining a specific binding event which comprise at least one microcavity light source, at least one photodetector and at least one planar waveguide, an evanescent field of light propagating in the waveguide interacting with the biological substance under test, and wherein the dimensions of the microcavity light source are in the order of half wavelength of light to be emitted.
2. (New) A biochip in accordance with claim 1 wherein the microcavity light source is a photonic band gap microcavity light source.
3. (Cancelled)
4. (Original) A biochip in accordance with claim 1 wherein either or both the light sources and the photodetectors are implemented in a thin film semiconductor layer.
5. (Original) A biochip in accordance with claim 4 wherein the light sources and photodetectors are implemented in the same semiconductor thin film layer.
6. (Original) A biochip in accordance with claim 4 wherein the semiconductor thin film material comprises semiconductor polymer.
7. (Cancelled)
8. (Original) A biochip in accordance with claim 4 wherein the thin film photodetector is a microcavity photodetector.
9. (New) A biochip in accordance with claim 8 wherein the microcavity photodetector is a photonic band gap microcavity photodetector.
10. (Previously amended) A biochip in accordance with claim 1 wherein the means for determining a binding event at each site comprise means for determining a refractive index change associated with a binding event.

11. (Original) A biochip in accordance with claim 10 wherein the means for determining refractive index change comprise a first planar waveguide on surface of which the binding event occurs, a second planar waveguide located below the first waveguide and separated by coupling layer of lower refractive index than that of the two waveguides.
12. (Original) A biochip in accordance with claim 10 wherein the means for determining refractive index change comprise a first planar waveguide on surface of which the binding event occurs, a grating formed in said waveguide, a second planar waveguide located below the first waveguide and separated by coupling layer of lower refractive index than that of the two waveguides.
13. (Previously amended) A biochip in accordance with claim 1 wherein the means for determining a binding event further comprise a reference light paths provided at each binding site for error correction.
14. (Previously amended) A biochip in accordance with claim 1 wherein the biochip further comprises a further plurality of electrodes to control hybridization conditions at each binding site.
15. (Original) A biochip in accordance with claim 14 wherein the electrodes comprise resistive heater electrodes formed underneath individual binding sites or groups of binding sites.
16. (Cancelled).
17. (Cancelled).
18. (Cancelled).
19. (Cancelled).
20. (Cancelled).